



Finding problems before they happen

DSW employees use innovative end-to-end relay testing

Story and photo by Melissa Chiechi

Western maintenance personnel work hard to avoid taking lines out of service to perform system tests. In the past five or six years, DSW Meter and Relay shop employ-

ees pioneered a new method of end-to-end relay testing without line outages and circuit breaker clearances. Their efforts helped DSW find problems before they happen using Secondary Injection Modeling and


Maintenance System testing.

SIMMS testing uses new technology to simulate line faults. Another common method used for end-to-end testing is the staged fault test. The staged fault method is common in the utility industry but was rarely used by DSW. In a staged fault test, a shorting conductor is placed across energized line conductors to stage an actual fault. After the fault, the information collected from the line relays is used to evaluate their effectiveness. Although thorough, staged fault tests are expensive and time consuming. Stage fault tests also require extra measures to ensure crew safety and system protection.

SIMMS testing uses computer simulations instead of actual staged faults. In the pretest phase, relay personnel develop a test plan and prepare the test equipment. CSO protection engineers perform a fault study. The test equipment is then set up for the simulation.

Global positioning system clock receivers synchronize the tests on laptop computers at each end of a line. Test sites can be hundreds of miles apart. DSW Meter and Relay Mechanic **Eulace Thomas** explained, "In the past, we tested parts of the system separately. SIMMS testing allows us to start the testing at the same time. It allows us to get the whole (system) together."

Following the actual test, engineers and experts analyze results take corrective actions as needed. They conduct more in-depth analysis in the post-test phase, evaluating the fault study and investigating any discrepancies. Reports can be prepared if required.

DSW has been a forerunner in using SIMMS testing. Since 1996, DSW has introduced and/or partnered with other utilities including Salt River Project, Southern California Edison and Los Angeles Department of Water and Power to perform this new end-to-end testing. "We've helped others work through the process of SIMMS testing and nearly perfected our own relay testing," Thomas said. 



Paul Yazzie, a DSW meter and relay mechanic, sets up equipment for a SIMMS test at Topock Substation.

IEEE publication features DSW

The Institute of Electrical and Electronics Engineers recently highlighted DSW's innovative use of Secondary Injection Modeling and Maintenance System testing in the July 2000 issue of *Computer Applications in Power*, an internationally distributed publication. DSW Protection Engineer **Mike Agudo**, Meter-Relay Foreman **Wayne Young**, Protection Engineer **Brian Kasperek** and Stanley Thompson of AVO International prepared a six-page article for the magazine. The article takes an in-depth look at the SIMMS testing process and its benefits.

SIMMS benefits

Secondary Injection Modeling and Maintenance System testing offers several benefits:

- ◆ Staged fault tests are no longer necessary.
- ◆ Preparation is less extensive than for a staged fault test.
- ◆ In most cases, SIMMS testing does not require line outages or circuit breaker clearances.
- ◆ External faults are easy to simulate on computers.
- ◆ Computer simulations are low cost and can be scheduled around other work.
- ◆ SIMMS testing is very accurate.
- ◆ SIMMS testing does not expose the testers nor the transmission system to safety risks inherent in any fault condition.